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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,629	09/05/2006	Ashutosh Misra	Serie 6550 CIP	3290
40582	7590	09/24/2007		
AIR LIQUIDE Intellectual Property 2700 POST OAK BOULEVARD, SUITE 1800 HOUSTON, TX 77056			EXAMINER KHOSRAVIANI, ARMAN	
			ART UNIT 2818	PAPER NUMBER
			MAIL DATE 09/24/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/591,629

Applicant(s)

MISRA ET AL.

Examiner

Arman Khosraviani

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 01/07.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 30 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 30 depends on claim 10 that was canceled by preliminary amendment.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent; or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English.

4. Claims 19, 21-22, and 24-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Buchanan et al. (US 6,984,591).

4. Claims 19, 21-22, and 24-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Buchanan et al. (US 6,984,591).

Regarding claim 19, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24, see also Abstract) a method for forming a MSiON or MSiO dielectric film comprising the steps of: a) vaporizing a metal source (M) to form a vaporized metal source; b) feeding a plurality of precursors to a deposition device, wherein said precursors comprise said vaporized metal source, a silicon source, an oxygen source, and a nitrogen source if MSiON is desired; and c) forming a dielectric film, wherein said dielectric film is formed with the desired final composition absent a post deposition step.

Regarding claim 21, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24) the method above, wherein said silicon source comprises a molecular structure absent carbon and/or a molecular structure absent chlorine.

Regarding claim 22, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24) the method above, wherein said silicon source is in vapor phase.

Regarding claim 24, Buchanan disclose (Example 1 in cols. 18-19: silane, disilanes, chlorosilanes, silylamines) the method above, wherein said silicon source is selected from the group comprising: a) disiloxane; b) trisilylamine; c) disilylamine; d) silylamine; e) tridisilylamine; f) aminodisilylamine; g) tetrasilyldiamine; h) disilane; i) derivatives of disilane and/or trisilane; and j) mixtures thereof.

Regarding claim 25, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24) the method above, wherein said oxygen source comprises a molecular structure absent carbon and/or a molecular structure absent chlorine.

Regarding claim 26, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 Ibid. see col. 22/lls. 46-52 and col. 23/lls. 42-49) the method above, wherein said oxygen source is selected from the group comprising: a) oxygen; b) nitrous oxide; c) ozone; d) disiloxane; and e) mixtures thereof.

Regarding claim 27, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24) the method above, wherein said nitrogen source comprises a molecular structure absent carbon and/or a molecular structure absent chlorine.

Regarding claim 28, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24) the method above, wherein said nitrogen source is the same as said metal source, said silicon source and/or said oxygen source.

Regarding claim 29, Buchanan disclose (Example 1 in cols. 18-19) the method above, wherein said nitrogen source is ammonia.

Regarding claim 30, Buchanan disclose (col. 5/lls. 43-67) the method above, wherein said metal source is selected from the group consisting of: a) a dialkylamino; and/or b) alkoxy ligands.

Regarding claim 31, Buchanan disclose (col. 5/lls. 43-67: metal M is selected from Hf, Zr, Ti, Nb...) the method above, wherein said metal source is an inorganic compound selected from the group consisting of: a) hafnium (Hf); b) zirconium (Zr); c) titanium (Ti); d) niobium (Nb); e) tantalum (Ta); f) scandium (Sc); g) yttrium (Y); h) lanthanum (La); i) gadolinium (Gd); j) europium (Eu); k) praseodymium (Pr) or any another lanthanide (Ln); and l) mixtures thereof.

Regarding claim 32, Buchanan disclose (Examples 3 and 4 in col. 19-21) the method above, wherein the amounts of said metal source and said silicon source in said desired final composition of said dielectric film are controlled independently (preferred amounts deposited using ALD in a cyclic fashion).

Regarding claim 33, Buchanan disclose (Example 11 and 12, Ibid., see also col. 7/lls. 30-51) the method above, wherein said dielectric film is completed by using a chemical vapor deposition process.

Regarding claim 34, Buchanan disclose (Example 11 and 12, Ibid., see also col. 7/lls. 30-51) the method above, wherein said dielectric film step is completed by using an atomic layer deposition process.

Regarding claim 35, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24, see also Abstract) a MSiON or a MSiO dielectric film obtained in accordance with the above method (claim 19).

Regarding claim 36, Buchanan disclose (e.g. figs. 1 and 4, Examples 11-12 in cols. 22-24, see also Abstract) a MSiN metallic film obtained in accordance with the above method (claim 19).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made

Art Unit: 2818

to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: **(See MPEP Ch. 2141)**

- a. Determining the scope and contents of the prior art;
- b. Ascertaining the differences between the prior art and the claims in issue;
- c. Resolving the level of ordinary skill in the pertinent art; and
- d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan et al. (US 6,984,591).

Regarding claim 20, Buchanan disclose (Example 1 in cols. 18-19) a method for forming a metallic film comprising the steps of: a) vaporizing a metal source to form a vaporized metal source; b) feeding a plurality of precursors to a deposition device, wherein said precursors comprise said vaporized metal source, a silicon source, and a nitrogen source; and c) forming a metallic film, wherein said metallic film is formed with the desired final composition absent a post deposition step. Although Buchanan do not explicitly teach a metal silicon nitride film, Buchanan suggest a multicomponent metal, and utilizing two or more different precursor source mixtures or

Art Unit: 2818

utilizing a precursor source mixture which contains two or more precursors. Therefore, it would have been obvious to combine a metal nitride source mixture with a metal silicide source mixture to yield an MSiN metallic film for the same benefit of forming a thin film with excellent electrical qualities and high conformality, and which avoids using multiple forming steps to obtain uniform coverage and high conformality.

Regarding claim 23, Buchanan disclose the claimed invention (as noted above) except for the silicon source having a vapor pressure of at least about 50 torr at 20°C (Note that a range of temperatures for a vapor phase silicon source is given in Example 1 in cols. 18-19, and Buchanan discloses concurrent feeding of the precursors col. 7/lls. 30-51, viz. the silicon source is in the vapor phase at process feed conditions). It would have been obvious to one of ordinary skill in the art at the time the invention was made to feed into the deposition device a silicon source having a vapor pressure of at least about 50 torr at 20°C, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Raaijmakers et al. (US 2001/0024387), Pomarede et al. (US 2002/0098627), Haukka et al. (US 2003/0049942), Shero et al. (US 2003/0072975), Pomarede et al. (US 6,613,695), Pomarede et al. (US 2004/0121620), Pomarede et al. (US

2004/0147101), Raaijmakers et al. (US 6,780,704), Raaijmakers et al. (US 2004/0175586), Haukka et al. (US 6,806,145), Raaijmakers et al. (US 6,831,315), Ahn et al. (US 6,921,702), Pomarede et al. (US 6,958,277), Shero et al. (US 6,960,537), Buchanan et al. (US 6,984,591), Pomarede et al. (US 7,056,835) show processes similar to the instant invention.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arman Khosraviani whose telephone number is 571-272-2554. The examiner can normally be reached on Monday to Friday, 7:30a - 5:00p (Eastern Time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Application/Control Number: 10/591,629

Page 9

Art Unit: 2818

STEVEN LOKE
SUPERVISORY PATENT EXAMINER

AK

A handwritten signature in black ink, appearing to read "Steven Loke". The signature is written in a cursive, flowing style with a large initial "S" and a distinct "L".